Appendix C
SURFACE WATER BASINS

The following sections provide a description of the surface water resources for basins within the Kissimmee Basin (KB) Planning Area. The KB Planning Area is divided at the outlet of Lake Kissimmee into upper and lower basins. The Upper Kissimmee Basin includes 17 subbasins while the Lower Kissimmee Basin includes 9 subbasins (**Figure C-1**).

UPPER KISSIMMEE BASIN

The Upper Kissimmee Basin is dotted with hundreds of lakes, ranging in size from small sinkholes and ponds to large lakes. The surface water drainage pattern includes a series of interconnected lakes in its northern portion, called the Kissimmee Chain of Lakes. Alligator Lake forms the drainage divide of the chain of lakes and water can be released either to the north or to the south. Northward flow goes though several canals and smaller lakes to Lake Mary Jane; the flow proceeds through Lakes Hart, East Tohopekaliga, and Tohopekaliga, then finally to Cypress Lake. Southward flow takes a shorter route through Lake Gentry and then to Cypress Lake. From Cypress Lake, water flows southward to Lake Hatchineha and then to Lake Kissimmee. Most of these lakes are shallow, with mean depths varying from 6 to 13 feet. The subbasins of the Upper Kissimmee Basin are generally bound by the drainage divides of major water bodies (**Table C-1**).

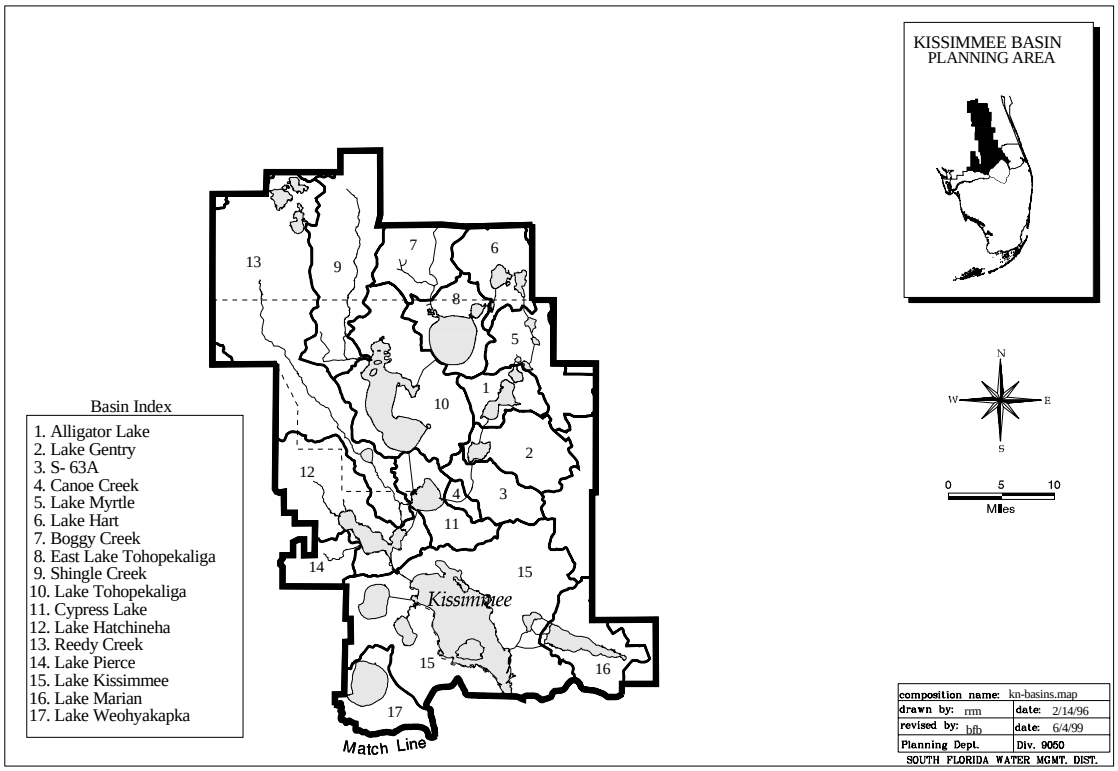
Alligator Lake Subbasin. The Alligator Lake subbasin has several lakes including Alligator Lake, Lake Lizzie, Coon Lake, Trout Lake, Live Oak Lake, Lake Center, Bay Lake, Sardine Lake, Buck Lake, Brick Lake, and Lake Pearl. Several of these lakes are linked by a series of short connecting channels. C-32 and C-33 are outlets of the Alligator Chain of Lakes (controlled by S-58 and S-60). The regulation schedule for the Alligator Lake subbasin is shown in **Figure C-2**.

Lake Gentry Subbasin. The Lake Gentry subbasin is in Osceola County. The main discharge of Alligator Lake is through S-60 via C-33 into Lake Gentry. Big Bend Swamp also drains to Lake Gentry. C-34 is the outlet of Lake Gentry (controlled by S-63). The regulation schedule for Lake Gentry is shown in **Figure C-3**.

S-63A Subbasin. The S-63A subbasin is located between S-63, the outlet for Lake Gentry, and S-63A. Approximately 2.8 miles of Canoe Creek Canal (C-34) are within the S-63A subbasin. The water levels in C-34 are regulated by S-63A.

Canoe Creek Subbasin. The Canoe Creek subbasin is located downstream of S-63A. This subbasin drains into Cypress Lake via Canoe Creek Canal (C-34). S-63A is located 2.8 miles from Cypress Lake

Lake Myrtle Subbasin. Most of the Lake Myrtle subbasin is within Osceola County, except for a small portion located within Orange County. Cat Lake, Lake Conlin, and Lake Preston discharge into Lake Myrtle. Lake Joel, which receives water from Trout Lake (Alligator Lake subbasin) through S-58, discharges into Lake Myrtle as well. Cat Lake also discharges to Buck Lake (Alligator Lake subbasin). These five lakes account for 10.5



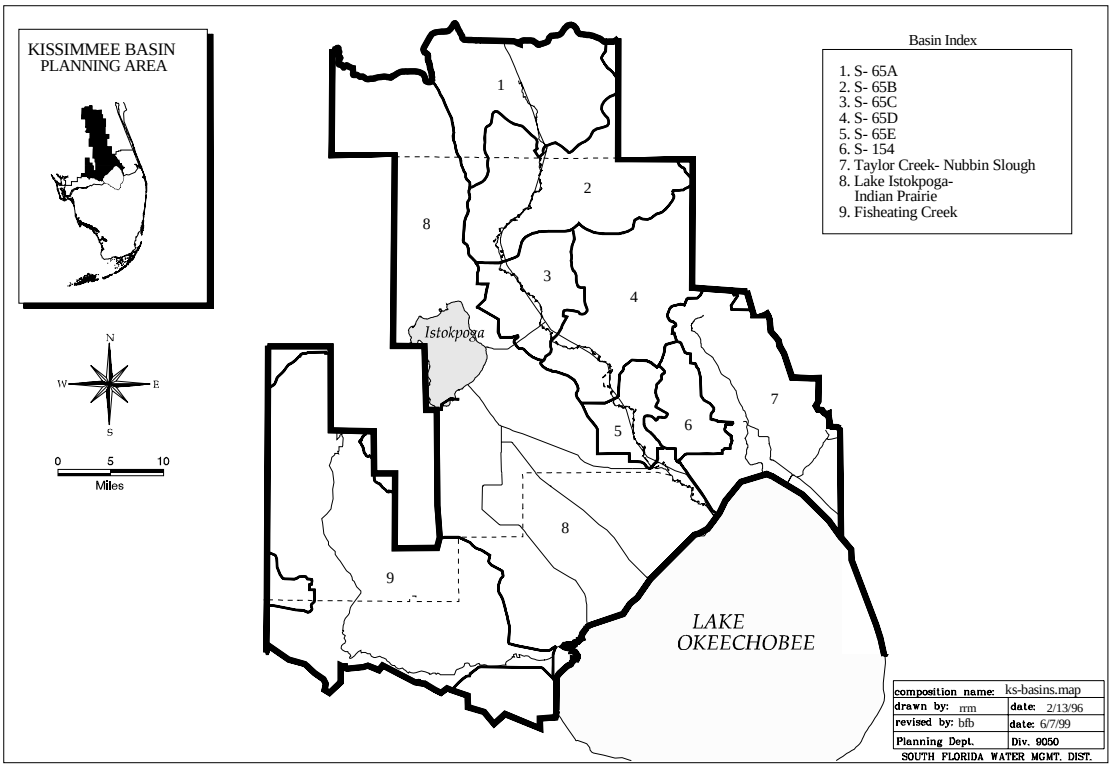


Figure C-1. Surface Water Subbasins in the Upper Kissimmee Basin (**top)** and the Lower Kissimmee Basin (**bottom**).

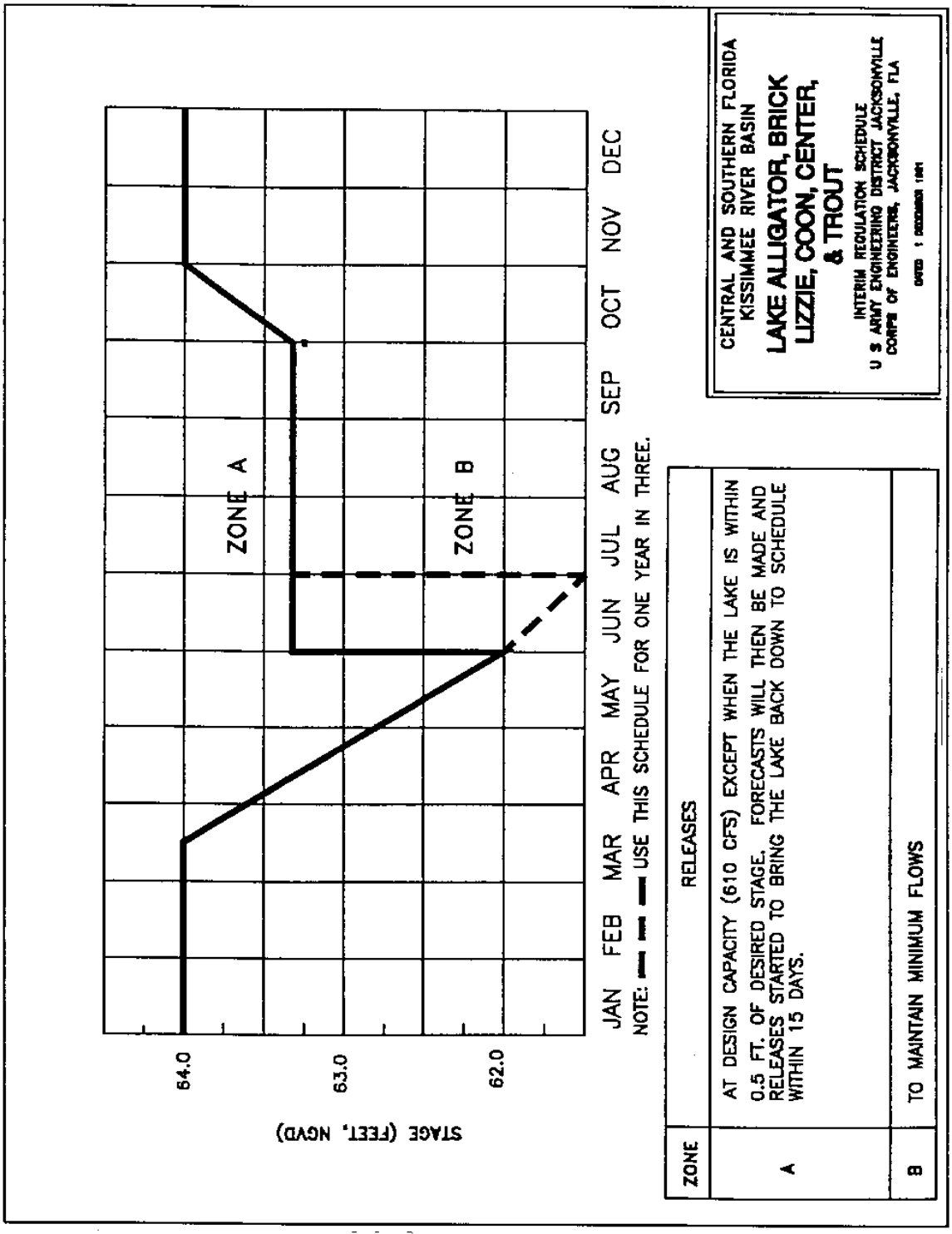


Figure C-2. Regulation Schedule for Alligator Lake Subbasin.

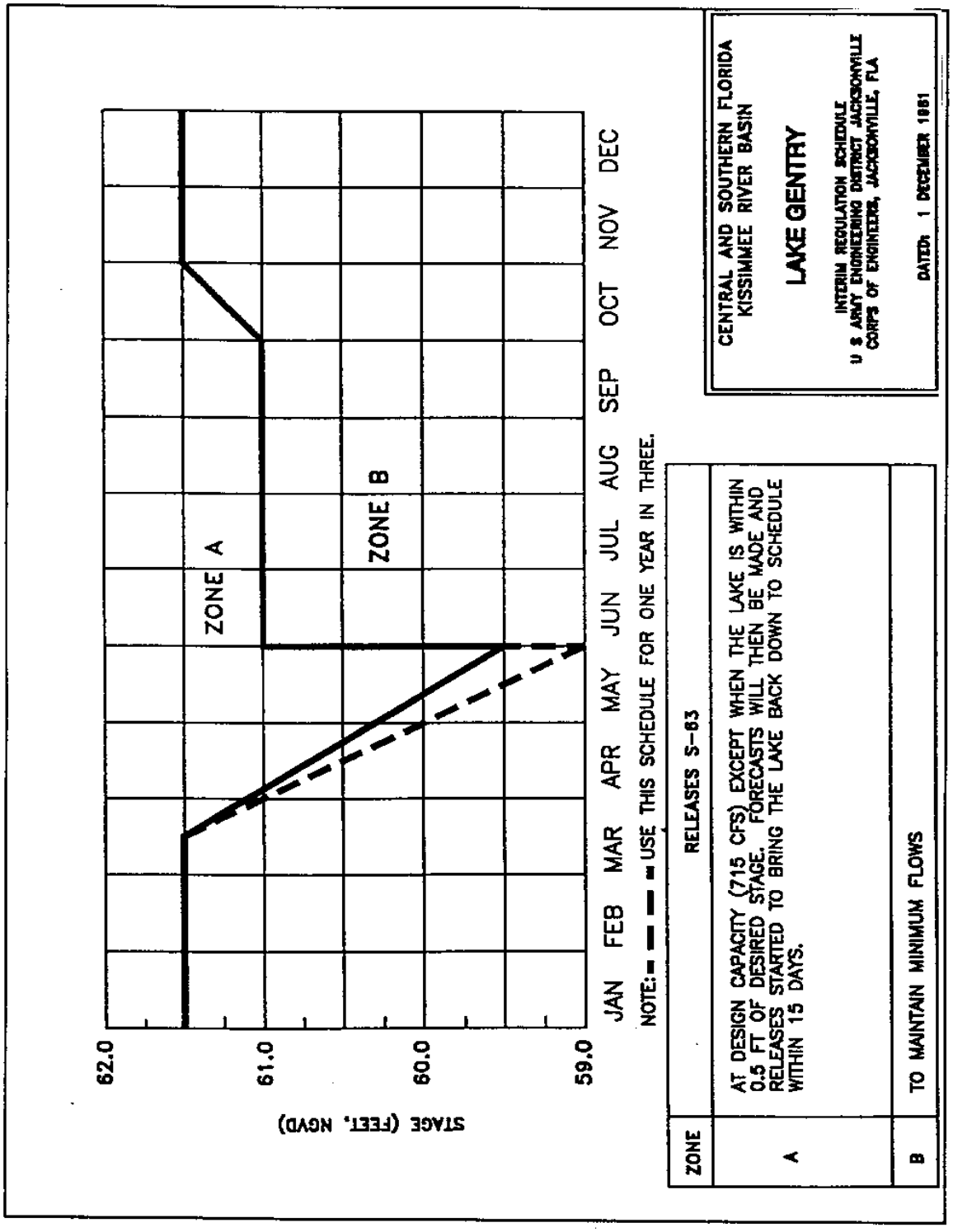


Figure C-3. Regulation Schedule for Lake Gentry Subbasin.

Table C-1. Subbasins in the Upper Kissimmee Basin.

Subbasin	Subbasin Area (sq. miles)	Major Water Bodies	Water Body Area (mi^2@ ft. NGVD)	Regulation Range (ft. NGVD)
Alligator Lake	31.5 (31.5 in Osceola County)	Alligator Lake	3.8 mi^2 @ 64.0 ft.	61.5 to 64.0
Lake Gentry	51.7 (51.7 in Osceola County)	Lake Gentry	2.8 mi^2 @ 61.8 ft.	59.5 to 61.5
S-63A	35.3 (35.3 in Osceola County)	Canoe Creek Canal (C-34)	[a]	56.5 to 57.5
Canoe Creek	6.9 (6.9 in Osceola County)	Canoe Creek Canal (C-34)	[a]	51.5 to 53.8
Lake Myrtle	62.9 (61.5 in Osceola County; 1.4 in Orange County)	Lake Myrtle	1.0 mi^2 @ 61.0 ft.	60.0 to 62.0
		Cat Lake	3.2 mi^2 @ 69.0 ft.	[b]
		Lake Conlin	9.8 mi^2 @ 69.0 ft.	[b]
Lake Hart	60.2 (56.5 in Orange County; 3.7 in Osceola County)	Lake Hart	5.7 mi^2 @ 61.0 ft.	59.5 to 61.0
		Lake Mary Jane	1.8 mi^2 @ 60.0 ft.	59.5 to 61.0
Boggy Creek	86.8 (86.8 in Orange County)	Lake Conway	1.7 mi^2 @ 86.9 ft.	[b]
East Lake Tohopekaliga	50.8 (40.7 in Osceola County; 10.1 in Orange County)	East Lake Tohopekaliga	19.9 mi^2 @ 56.3 ft.	54.5 to 58.0
Shingle Creek	111.4 (83.1 in Orange County; 29.4 in Osceola County)	Big Sand Lake	1.7 mi^2 @ 90.0 ft.	[b]
Lake Tohopekaliga	131.5 (125.6 in Orange County; 5.9 in Osceola County)	Lake Tohopekaliga	30.2 mi^2 @ 53.7 ft.	59.5 to 61.5
Cypress Lake	42.5 (42.0 in Osceola County; 0.5 in Polk County)	Cypress Lake	6.4 mi^2 @ 52.0 ft.	48.5 to 54.0
Lake Hatchineha	128.5 (96.5 in Polk County; 32.0 in Osceola County)	Lake Hatchineha	14.8 mi^2 @ 51.8 ft.	48.5 to 54.0
		Lake Marion	5.4 mi^2 @ 67.0 ft.	[b]
Reedy Creek	269.1 (103.2 in Osceola County; 107.3 in Orange County; 34.2 in Polk County; 24.4 in Lake County)	Reedy Creek	[a]	[b]
		Lake Butler	2.6 mi^2 @ 98.0 ft.	[b]
		Lake Tibet	1.8 mi^2 @ 98.0 ft.	[b]
Lake Pierce	76.0 (76.0 in Polk County)	Lake Pierce	6.1 mi^2 @ 76.0 ft.	[b]
Lake Kissimmee	269.3 (178.2 in Osceola County; 91.1 in Polk County)	Lake Kissimmee	55.5 mi^2 @ 50.8 ft.	48.5 to 54.0
		Lake Jackson	1.6 mi^2 @ 51.0 ft.	51.0 to 56.0
		Lake Rosalie	9.1 mi^2 @ 53.8 ft.	[b]
		Tiger Lake	4.8 mi^2 @ 51.0 ft.	49.0 to 52.5
Lake Marian	57.9 (57.9 in Osceola County)	Lake Marian	7.9 mi^2 @ 59.1 ft.	58.0 to 60.0
Lake Weohyakapka	97.8 (97.8 in Polk County)	Lake Weohyakapka	11.9 mi^2 @ 60.0 ft.	[b]

a. Not a lake, therefore surface area not applicable.

b. SFWMD does not regulate.

percent of the total area of the basin. Lake Myrtle discharges into Lake Mary Jane (Lake Hart subbasin) by S-57 via C-30. Lakes Joel, Myrtle, and Preston are regulated by S-57, which is located in C-30 and connects Lakes Myrtle and Mary Jane. The regulation schedule for the Lake Myrtle subbasin is shown in **Figure C-4**.

Lake Hart Subbasin. Lakes in this subbasin in addition to Lake Hart are Lake Mary Jane (connected to Lake Hart by C-29), Lake Nona, Red Lake, Buck Lake, Barton Lake (connected to Lake Hart by Myrtle Bay), Hinden Lake, and Ajay Lake (downstream of S-62, and connected to East Lake Tohopekaliga by C-29B). Lakes account for 11.7 percent of the total subbasin area. The two other major District canals in this subbasin are C-30 and C-29A. C-30 connects Lake Myrtle with Lake Mary Jane. C-29A connects Lake Hart with Ajay Lake. The lakes in this subbasin are regulated by S-62 which is located in C-29A. The regulation schedule for the Lake Hart subbasin is shown in **Figure C-5**.

Boggy Creek Subbasin. The Boggy Creek subbasin is located in Orange County. This subbasin is the largest tributary to East Lake Tohopekaliga. There are 24 named lakes in the subbasin whose sizes vary from 8 acres to 1.7 square miles (Lake Conway). Of the 24 lakes, only three are not landlocked at normal stage.

Boggy Creek has two main branches: East and West. The East Branch is the main water course of the Boggy Creek, which is 12 miles in length and whose headwaters originate in the southern lobe of Lake Conway. A canal on the east side of Lake Conway flows eastward to Lake Warren, then flows into a channelized water course southward, discharging into Boggy Creek Swamp, and then into East Lake Tohopekaliga.

The West Branch of Boggy Creek extends from Lake Jessamine to Boggy Creek Swamp. Due to the obstruction of the culverts under Oak Ridge Road, there is no flow through these culverts under normal conditions. During floods, the flow is from areas upstream of Oak Ridge Road into Lake Jessamine, and then continues to drain into Lake Conway.

The upper portion of the Boggy Creek subbasin is within the general urban area of Orlando. This area is experiencing heavy urbanization. Orlando International Airport covers 43 percent of the subbasin; and Boggy Creek Swamp along with other wetlands, lakes, and ponds account for 18 percent of the subbasin area.

East Lake Tohopekaliga Subbasin. The city of St. Cloud, located on the south shore of East Lake Tohopekaliga, is the largest urbanized area in this subbasin. Lake Runnymede is the second largest lake in the subbasin, and has a surface area of 300 acres. Lake Runnymede is connected to East Lake Tohopekaliga by Runnymede Canal. The Boggy Creek subbasin is the major tributary of East Lake Tohopekaliga. C-31 is the outlet of East Lake Tohopekaliga (controlled by S-59). The regulation schedule for the East Lake Tohopekaliga subbasin is shown in **Figure C-6**.

Shingle Creek Subbasin. The Shingle Creek subbasin is a major tributary to Lake Tohopekaliga. There are 22 named lakes in the subbasin with surface areas ranging from 10 acres to 1.7 square miles (Big Sand Lake). Most of these lakes are landlocked at normal

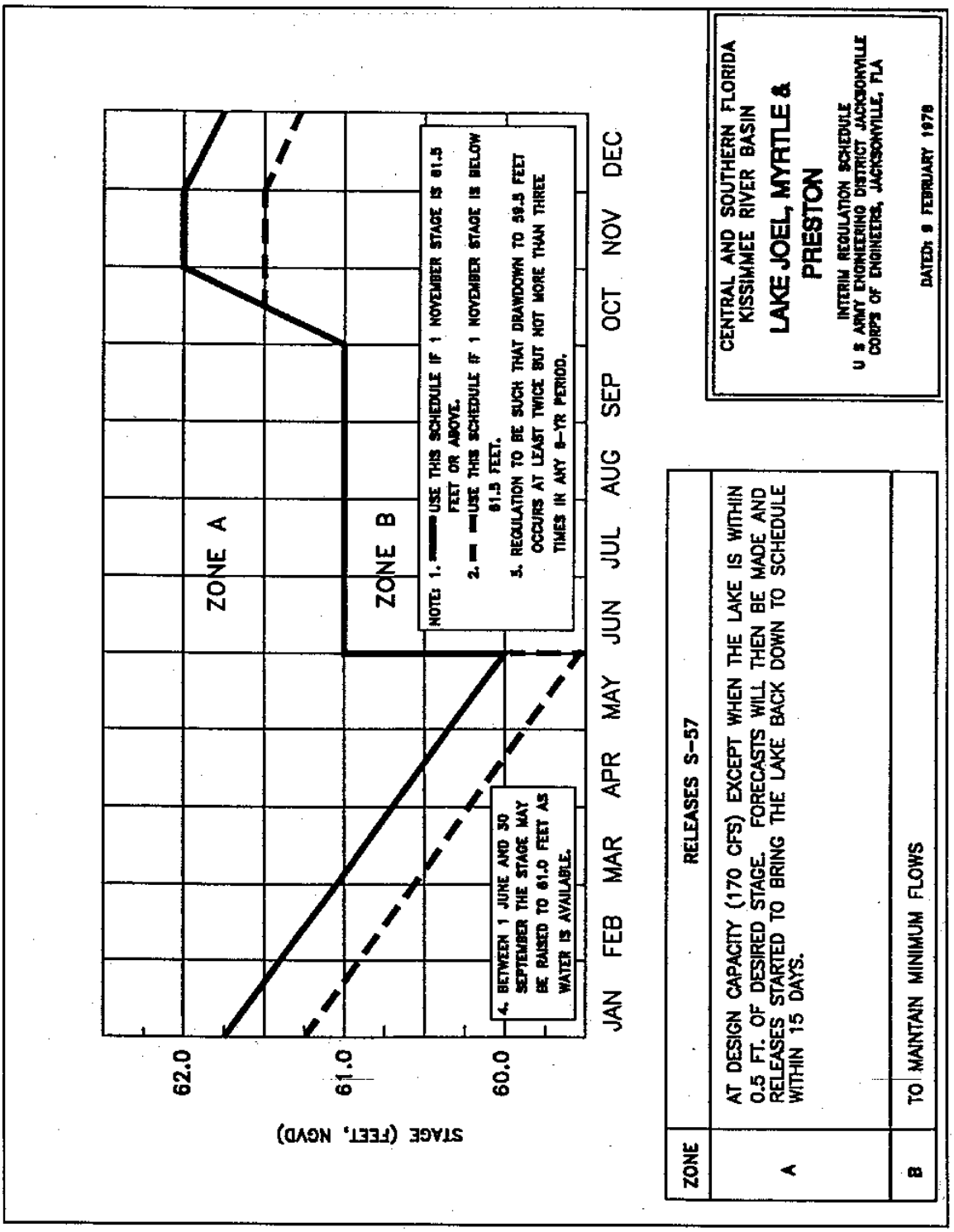


Figure C-4. Regulation Schedule for Lake Myrtle Subbasin.

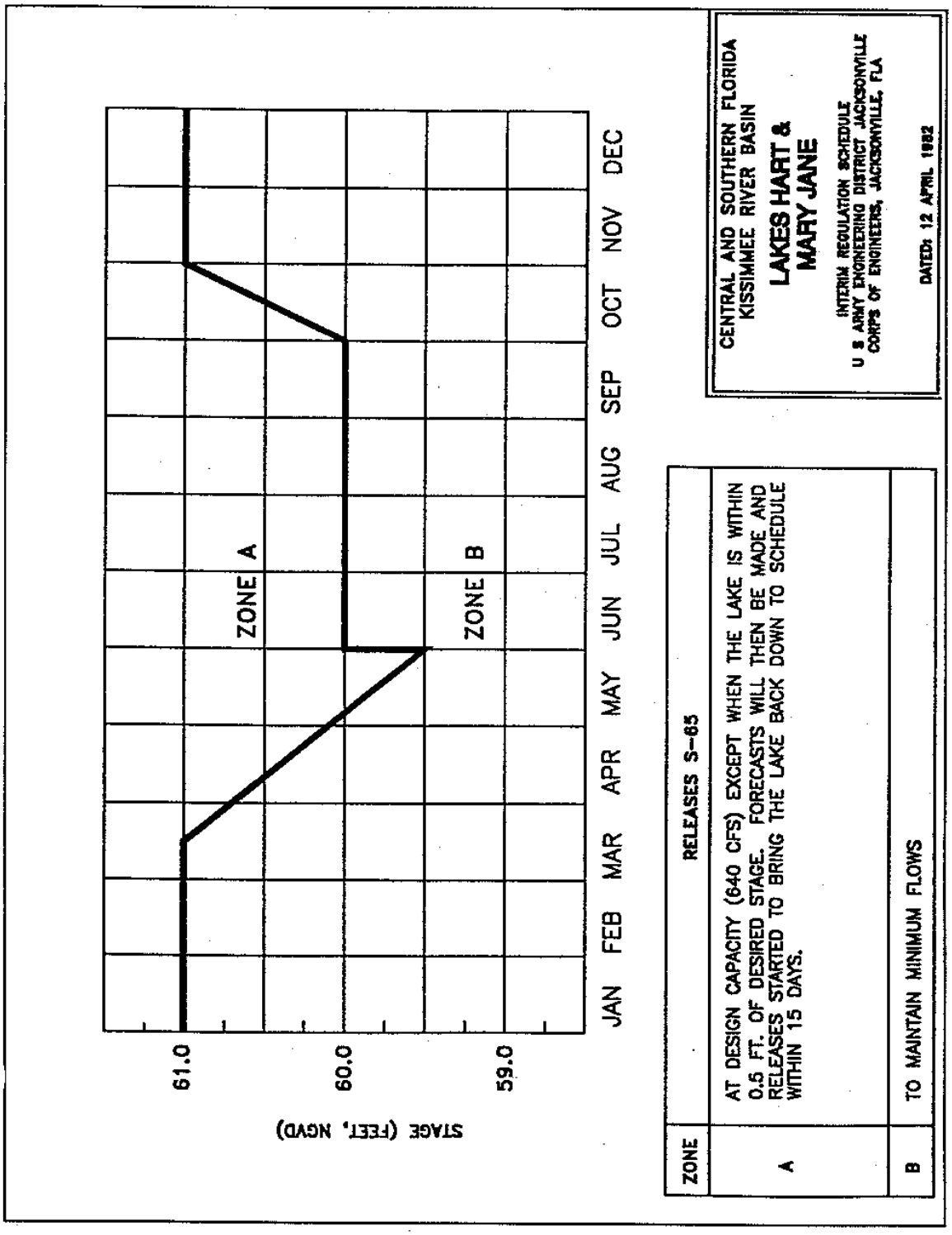


Figure C-5. Regulation Schedule for Lake Hart Subbasin.

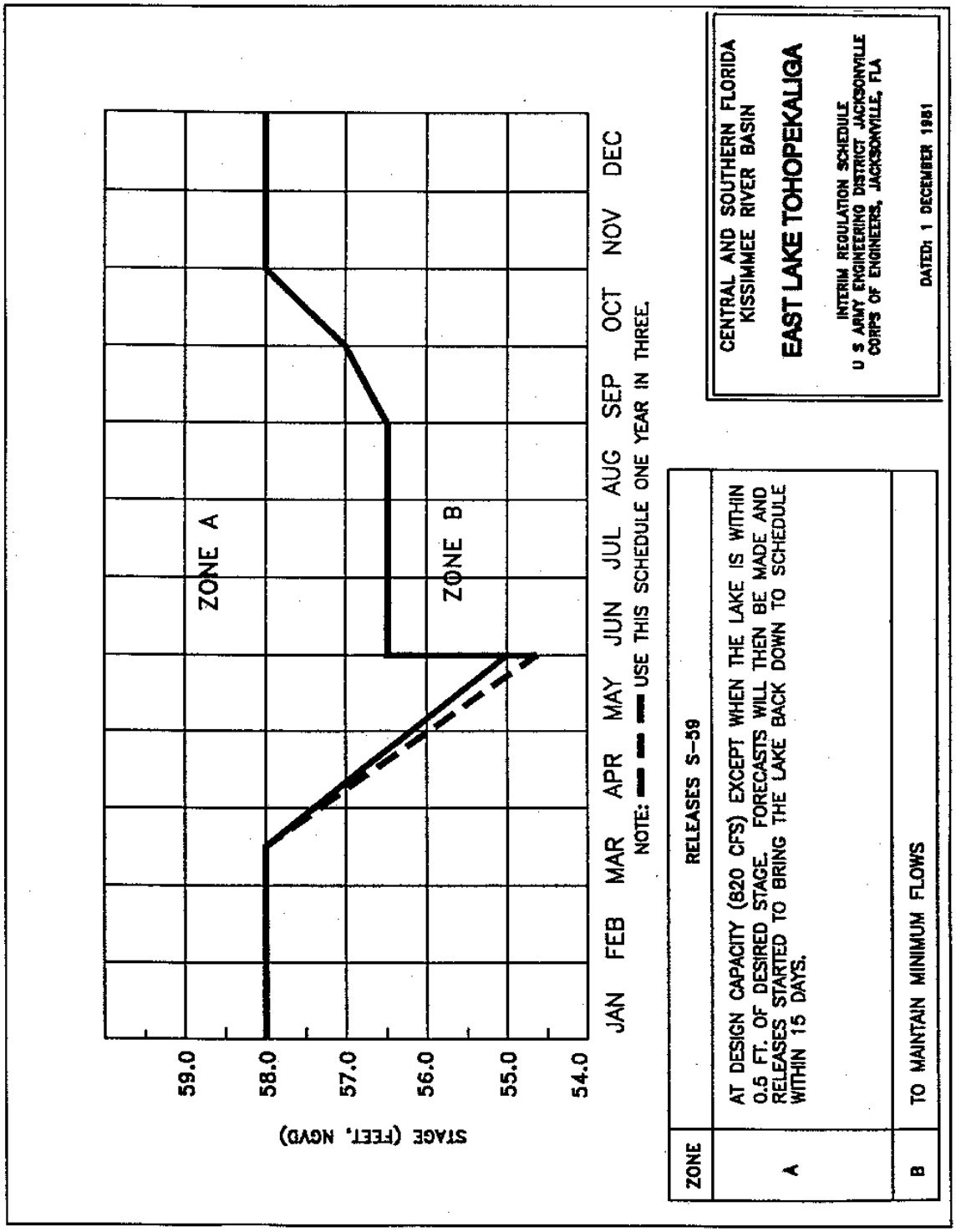


Figure C-6. Regulation Schedule for East Tohopekaliga Subbasin.

stages. Several lakes are directly connected to Shingle Creek, including Lake Mann, Clear Lake, Lake Cain, Turkey Lake, Rattlesnake Lake and Lake Catherine.

Shingle Creek begins at the Westside Manor pump station and receives water from Clear Lake. Runoff from the populated areas west and south of the city of Orlando drain into the headwaters of Shingle Creek. The creek then runs southward for 24 miles through Shingle Creek Swamp and the city of Kissimmee, where it combines with the Brown Farm Canal before emptying into Lake Tohopekaliga. Approximately 13 miles of the creek, from its headwaters to just south of the swamp, have been channelized.

The Valencia Water Control District is located within the Shingle Creek subbasin, bordering the Shingle Creek Swamp. This district is heavily populated and intensely developed, and includes Sea World and the commercial developments along International Drive.

Lake Tohopekaliga Subbasin. The subbasin is located within Osceola County except for the northernmost portion, which is in Orange County. The southernmost point of Lake Tohopekaliga is the discharge outlet into Cypress Lake through S-61 via South Port Canal (C-35). Lake Tohopekaliga receives inflow from Shingle Creek, and from East Lake Tohopekaliga via the St. Cloud Canal. The regulation schedule for the Lake Tohopekaliga subbasin is shown in **Figure C-7**.

Cypress Lake Subbasin. Cypress Lake is the only lake in this subbasin. This lake receives inflow from Lake Gentry through S-63A via C-34, and from Lake Tohopekaliga through S-61 via C-35 and about 30 percent of Reedy Creek's flow.

Cypress Lake connects with Lake Hatchineha via the Cypress-Hatchineha Canal (C-36). This is the major outflow canal for Cypress Lake; however, flow over the south shore of Cypress Lake into Lake Kissimmee via the Cypress-Kissimmee Canal has occurred in the past during high water level conditions. There is no water control structure in C-36. Cypress Lake, together with Lake Hatchineha, and Lake Kissimmee, is regulated by S-65. This structure is located at the outlet of Lake Kissimmee in the Kissimmee River (C-38).

Lake Hatchineha Subbasin. The Haines City Drainage District is located in the Polk County Area of the Lake Hatchineha subbasin. Inflow to Lake Hatchineha includes water from Cypress Lake via C-36, Reedy Creek subbasin via Dead River, Horse Creek subbasin via Snell Creek and Marion Creek, and Lake Pierce subbasin via Catfish Creek. Outflow from Lake Hatchineha to Lake Kissimmee is through C-37. There are no water control structures in C-36 or C-37.

Lake Marion is the second largest lake in this subbasin. Waters from the Horse Creek subbasin drain into Snell Creek, then join Lake Marion Creek just downstream of Lake Marion before discharging into Lake Hatchineha.

Reedy Creek Subbasin. There are more than 20 named lakes in the Reedy Creek subbasin. Most of them are within the Reedy Creek Improvement District, which operates

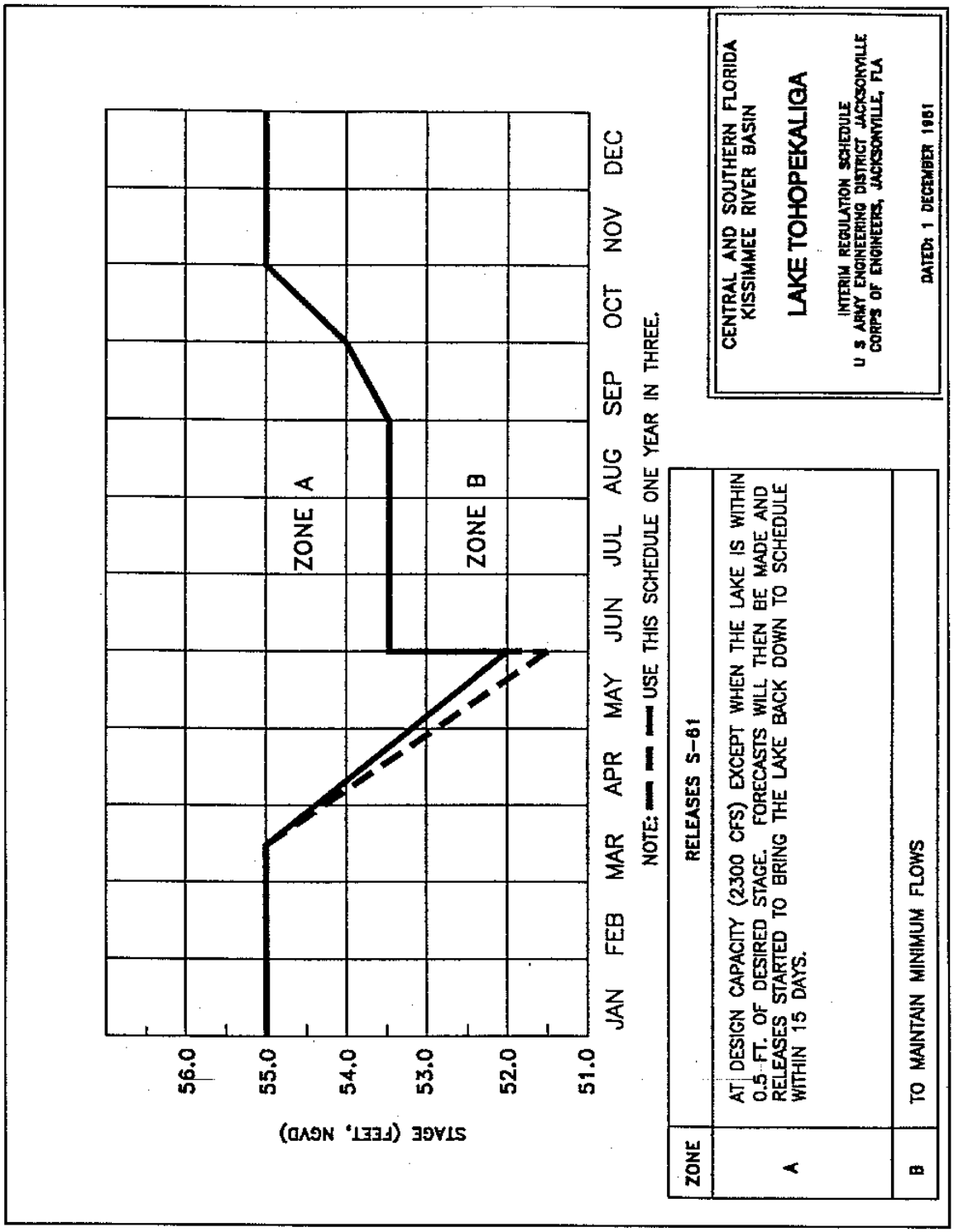


Figure C-7. Regulation Schedule for Lake Tohopekaliga Subbasin.

and maintains a system of canals and control structures for water management purposes. This district includes Walt Disney World and the associated Disney attractions. Reedy Creek runs southeast for 29 miles before splitting into two branches near Cypress Lake. One branch enters Cypress Lake and the other, known as Dead River, enters Lake Hatchineha. Reedy Creek forms Lake Russell, which is about seven miles upstream of Cypress Lake.

Lake Pierce Subbasin. Lake Pierce, is the major lake in this subbasin. Water from Lake Pierce is a major tributary of Lake Hatchineha via Catfish Creek. The other named lakes in the subbasin are Saddlebags, Thomas, Parks, Cypress, Little Gum and Big Gum lakes. These lakes range in size from 25 to 170 acres. Flow from those lakes contribute to Catfish Creek before discharging into Lake Hatchineha.

Lake Kissimmee Subbasin. The four major lakes in this basin are Lake Kissimmee, Lake Jackson, Lake Rosalie, and Tiger Lake. Lake Jackson receives water from Lake Marian by G-113. The outflow from Lake Jackson to Lake Kissimmee is by way of the Jackson Canal via the Lake Jackson Structure. Lake Rosalie receives inflow from Lake Weohyakapka and discharges into Tiger Lake via Rosalie Creek, and into Zipper Canal via G-103. Lake Kissimmee also receives water from Lake Hatchineha via C-37, and from the Cypress-Kissimmee Canal during extra high water level conditions in Cypress Lake. The S-65 structure located at the southern end of Lake Kissimmee is the sole outlet of Lake Kissimmee and the chain of lakes. Lake Kissimmee as well as Lakes Hatchineha and Cypress are normally regulated by S-65.

The current regulation schedule for Lakes Kissimmee, Hatchineha and Cypress is shown in **Figure C-8**. As part of the Kissimmee River Restoration Project, a new regulation schedule and operational rules were developed (**Figure C-9**). The new schedule is designed to modify the delivery of water from S-65 subbasin to the Kissimmee River, to reflect a more natural rainfall driven flow regime. The new schedule will be implemented in May 2000.

Lake Marian Subbasin. The Lake Marian subbasin is located in the southeast of the Upper Kissimmee Basin. Lake Marian is the only lake in the subbasin, and discharges into Lake Jackson through G-113, which is a culvert that maintains stage in Lake Marian. When the water level in the lake reaches 59.0 feet NGVD, flow also begins into Lake Kissimmee from Lake Marian through Fodderstack Slough.

Lake Weohyakapka Subbasin. The subbasin is located in Polk County. There are four other named lakes in the subbasin, Lakes Wales, Easy, Leonore, and Moody, which have a combined area of 320 acres and are located along the western boundary of the subbasin. Lake Weohyakapka is connected to Lake Rosalie by Weohyakapka Creek. When the lake stage is above 63.5 feet NGVD, water may flow through the Blue Jordan Swamp into Lake Arbuckle, which is located in the Lower Kissimmee Basin.

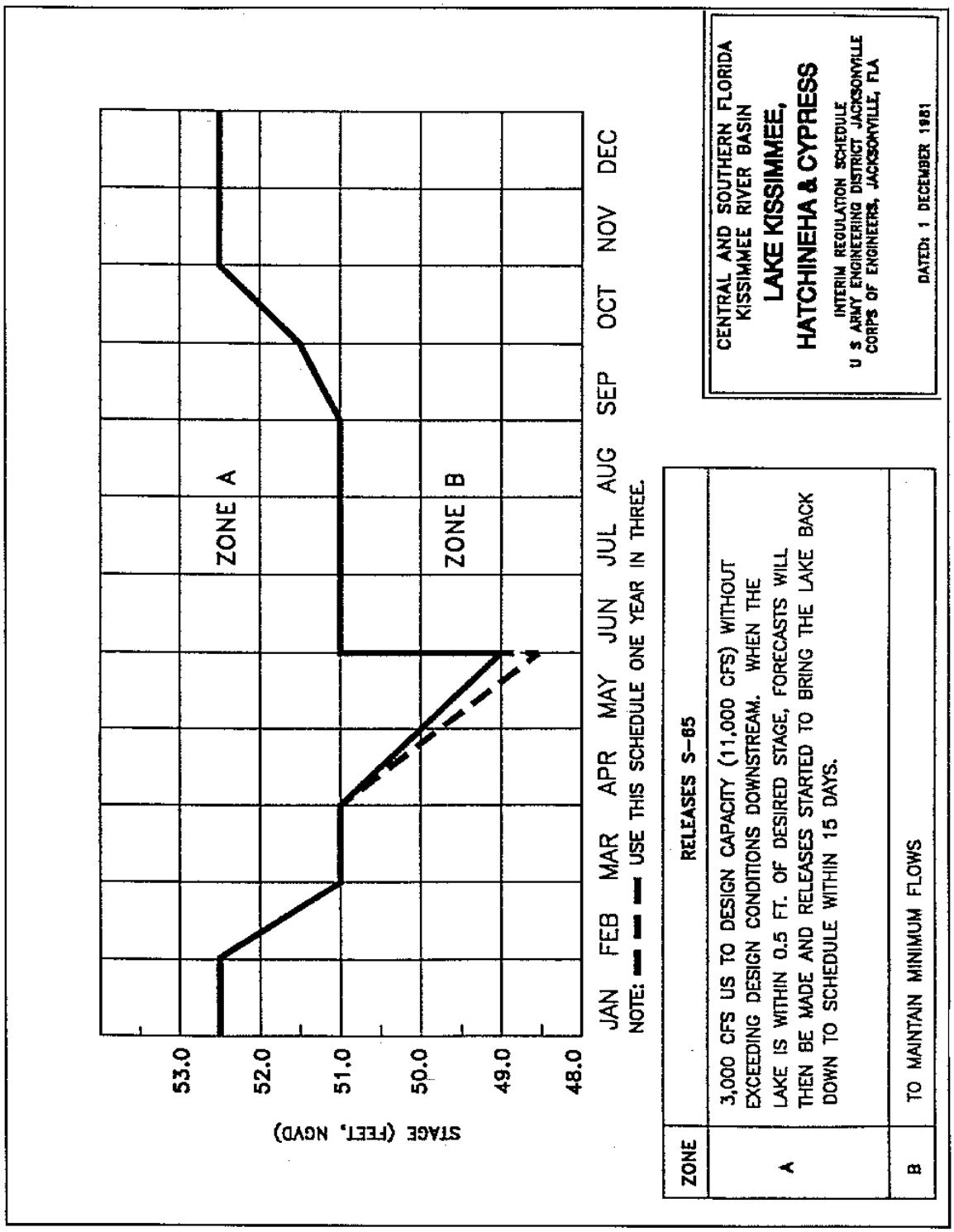


Figure C-8. Regulation Schedule for Lake Kissimmee Subbasin.

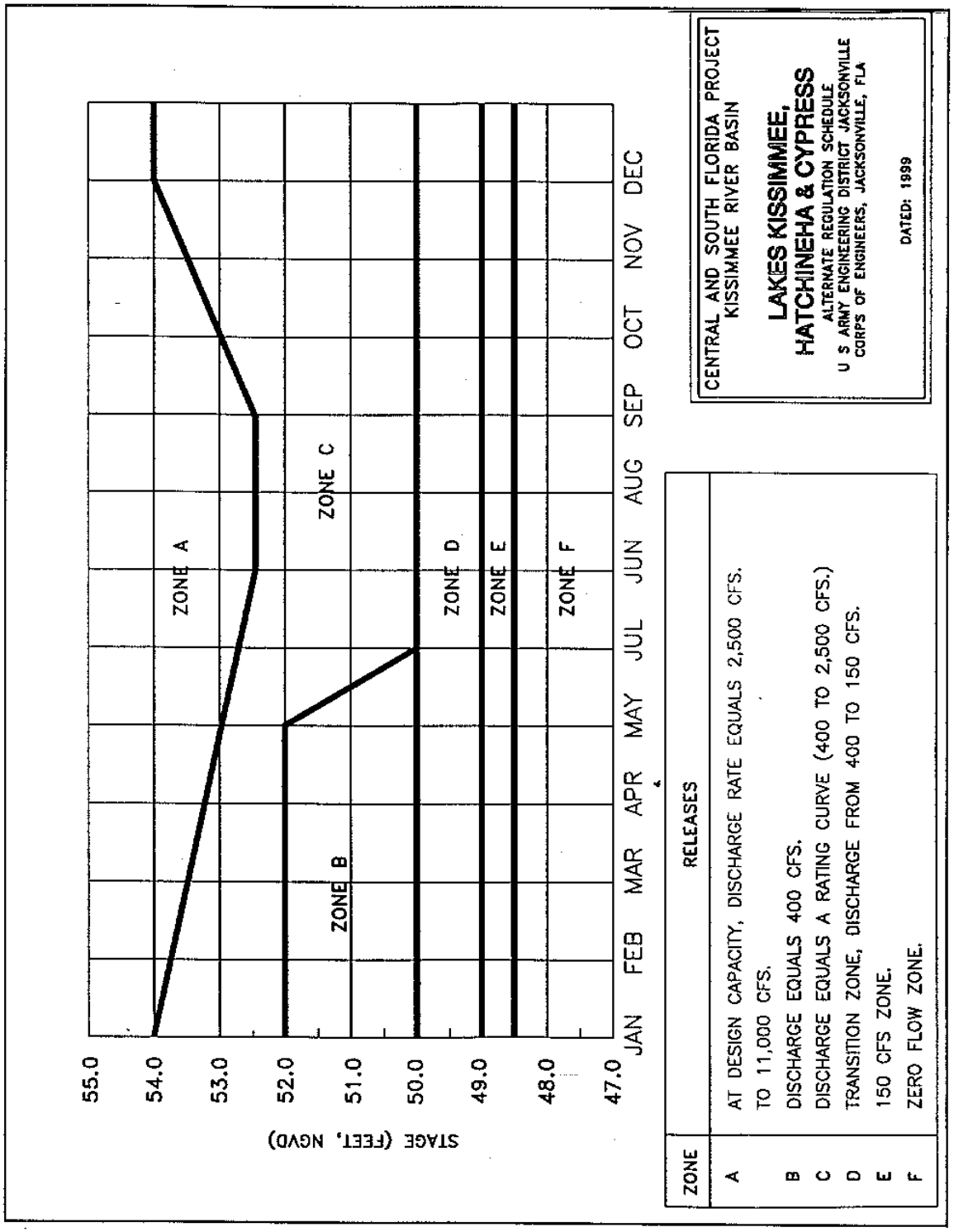


Figure C-9. Proposed Regulation Schedule for Lakes Kissimmee, Hatchinaha, and Cypress.

LOWER KISSIMMEE BASIN

The Lower Kissimmee Basin includes the tributary watersheds of the Kissimmee River between the outlet of Lake Kissimmee (S-65) and Lake Okeechobee. The subbasins of the Lower Kissimmee Basin are generally bound by the drainage divides of major water bodies (**Table C-2**).

Table C-2. Subbasins in the Lower Kissimmee Basin.

Subbasin	Subbasin Area (sq.miles)	Major Water Bodies	Water Body Area (mi^2 @ stage)	Regulation Range (ft. NGVD)
S-65A	161.4 (79.0 in Osceola County; 77.0 in Polk County; 5.4 in Highlands County)	Pool A	a	46.3 +/- 2.0
S-65B *(to be removed during Kissimmee River Restoration Project)*	200.4 (98.0 in Okeechobee County; 45.5 in Highlands County; 40.8 in Osceola County; 16.1 in Polk County)	Pool B	a	Fluctuates seasonally between 38-42
S-65C *(to be removed during Kissimmee River Restoration Project)*	78.9 (43.4 in Okeechobee County; 35.5 in Highlands County)	Pool C	a	34.0 +/- 2.0
S-65D	182.2 (158.7 in Okeechobee County: 23.5 in Highlands County)	Pool D	a	26.8 +/- 2.0
S-65E	45.5 (23.7 in Okeechobee County; 21.8 in Highlands County)	Pool E	a	21.0 +/- 2.0
S-154	49.4 (49.4 in Okeechobee County)	a	a	b
Taylor Creek - Nubbin Slough	256.2 (199.8 in Okeechobee County; 46.8 in Martin County; 9.3 in St. Lucie; 0.3 in Glades)	a	a	b
Lake Istokpoga-Indian Prairie (within SFWMD)	727.8 (392.6 in Highlands County; 241.8 in Glades County; 87.1 in Polk County; 6.3 in Okeechobee County)	Lake Istokpoga	44.3 mi^2 @ 39.0 ft.	37.0 to 39.5
		Lake Arbuckle	6.0 mi^2	b
		Reedy Lake	5.4 mi^2	b
Fisheating Creek	441.0 (260.7 in Highlands County; 179.4 in Glades County; 0.9 in DeSoto County)	Fisheating Creek	a	b

a. Not a lake, therefore surface area not applicable.

b. SFWMD does not regulate.

S-65 Subbasins. There are a series of five subbasins (S-65A through E) along the length of the C-38. **T**hese structures divide the C-38 into five pools (**Table C-3**). The water level in each of these pools is regulated according to an interim regulation schedule for the Kissimmee River Pools (**Figure C-10**).

The Kissimmee River Restoration Project includes removal of the S-65B and S-65C spillway structures and locks. S-65B will be removed with the first phase of construction, which began in June 1999. The S-65C structure is scheduled for removal during the third phase of construction. The S-65A lock and spillway will not be removed. However, the west tieback levee will be degraded to an elevation of 49 feet with three, 200 feet gaps at elevations of 48 feet each. The east tieback levee will remain at the present elevation. Culverts will be installed to allow flow through the east levee when water elevations exceed 48 feet. Modifications to S-65D are in the planning phase. Preliminary designs include a new single bay spillway to replace the existing S-65DX structure. This spillway will be used to control normal flows through the restored Kissimmee River. The main spillway will be used to accommodate high discharges as needed. The operational rules for S-65A, S-65D, and S-65E will be modified to provide a more natural, seasonally variable flow regime, reflective of local and regional climatic conditions.

Table C-3. C-38 Pool Characteristics.

Characteristics	Pool				
	A	B[a]	C[a]	D	E
Upstream Structure	S-65	S-65A	S-65B	S-65C	S-65D
Downstream Structure	S-65A	S-65B	S-65C	S-65D	S-65E
Water Surface Elevation (ft) Width (ft)	 46.3 210.0	 40.0 220.0	 34.0 260.0	 26.8 300.0	 21.0 345.0
Bottom Elevation (ft) Width (ft)	 15.5 90.0	 6.5 100.0	 -0.4 140.0	 -6.2 180.0	 -11.0 225.0
Pool Length (mi)	10.6	12.3	8.6	8.9	7.4

a. These structures will be removed during the Kissimmee River Restoration Project.

S-154 Subbasin. The S-154 subbasin is located west of the city of Okeechobee. S-154 is the major water control structure in the subbasin. This structure is operated to maintain an optimum stage of 25 feet NGVD. S-154 is designed to pass about 1,000 cfs discharge from a 30 percent SPF. It also prevents backflow from Lake Okeechobee during excessive stages in the lake caused by high tide or flood. It drains into the C-38 below S-65E.

Taylor Creek-Nubbin Slough Subbasin. This subbasin, located along the northeastern shore of Lake Okeechobee, and includes areas tributary to Taylor Creek-Nubbin Slough, Williamson's Ditch, Lettuce, Little Bimini Creek, Otter Creek, Henry Creek

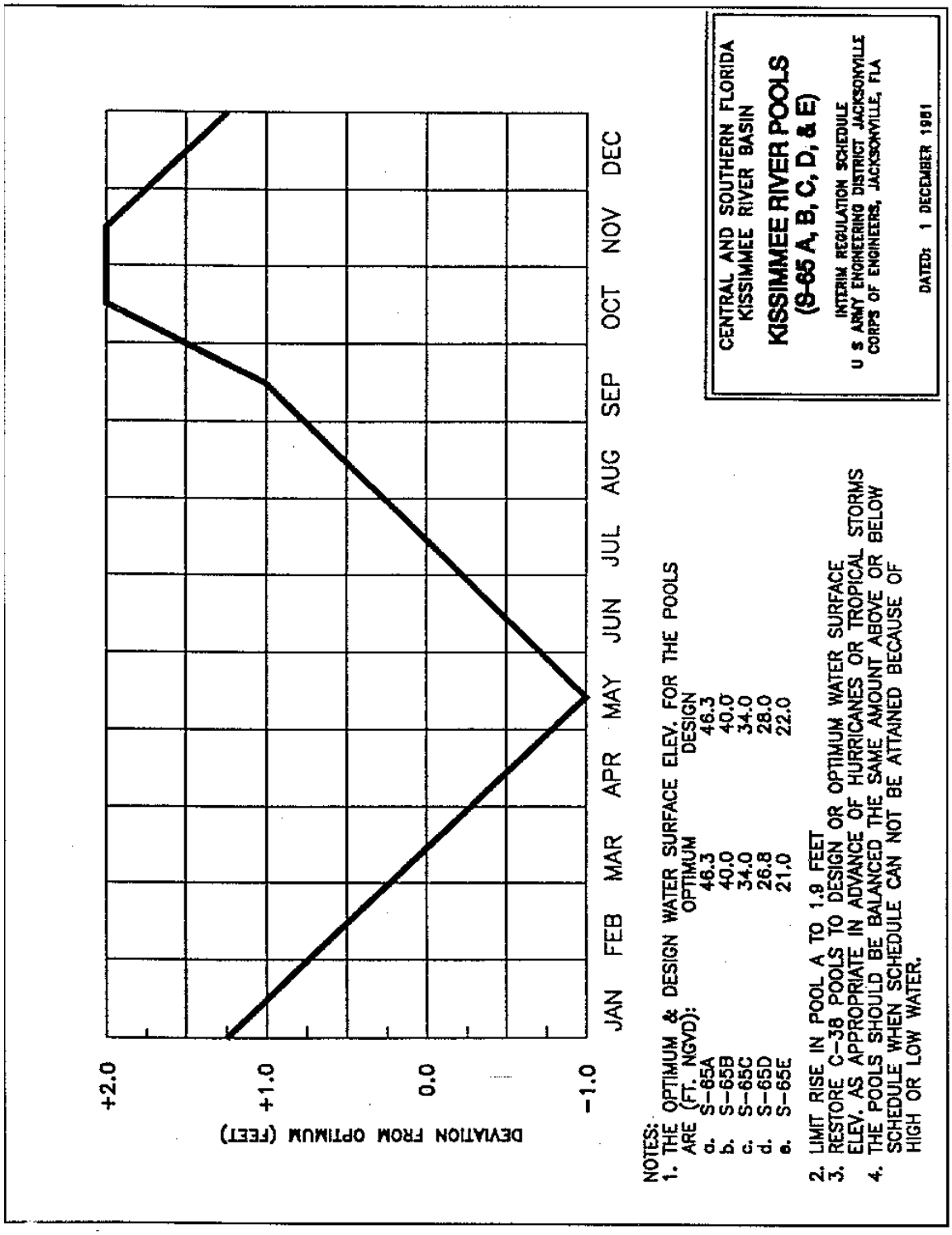


Figure C-10. Regulation Schedule for Kissimmee River Pools (S-65) Subbasin.

and Mosquito Creek. The majority of flow from Taylor Creek is diverted by S-192 to Nubbin Slough via an interceptor canal. Flow from Nubbin Slough then enters Lake Okeechobee through S-191. The lower reaches of Taylor Creek, downstream of S-192, empty into Lake Okeechobee through L-D4 via Hurricane Gate Structure 6 (HGS-6).

Lake Istokpoga-Indian Prairie Subbasin. The Lake Istokpoga-Indian Prairie subbasin includes Harney Pond Canal, Indian Prairie Canal, and the State Road 70 Canal subbasin. The Lake Istokpoga-Indian Prairie subbasin includes the cities of Avon Park and Sebring. Arbuckle and Josephine Creeks are tributaries to Lake Istokpoga. The regulation schedule for Lake Istokpoga is shown in **Figure C-11**.

S-68 discharges water from Lake Istokpoga into C-41A, then into associated downstream canals: Slough Canal (C-41A), Harney Pond Canal (C-41), and Indian Prairie Canal (C-40) via C-39A. C-40 and C-41 discharge into Lake Okeechobee via S-72 and S-71 respectively, while C-41A discharges into the C-38 via S-84. The Istokpoga Canal connects Lake Istokpoga to C-38, between S-65B and S-65C. Releases from S-68 are made in accordance with an established regulation schedule shown in **Figure C-11**. The regulation schedule has been adopted as part of the District's water shortage rule (40E-22, F.A.C.).

The final Restudy Plan that was forwarded to Congress in April 1999 recommended the District and USACE to review the regulation schedule for Lake Istokpoga, beginning in the summer of 2000. The purpose of this effort is to examine the basin with a view towards enhancing fish and wildlife benefits and developing a long-term comprehensive management plan. The exact timing of this effort is contingent upon successful negotiation of a Preconstruction Engineering and Design Agreement with the federal government.

Fisheating Creek Subbasin. The Fisheating Creek subbasin covers portions of western Highlands and Glades counties. Fisheating Creek originates in western Highlands County and flows southward through Cypress Swamp and into Glades County, with an average gradient of 0.5 feet per mile. From central Glades County, the water leaves the creek channel and flows eastward through Cowbone Marsh into Lake Okeechobee. Levees have been constructed roughly parallel to the creek near its outlet to the lake.

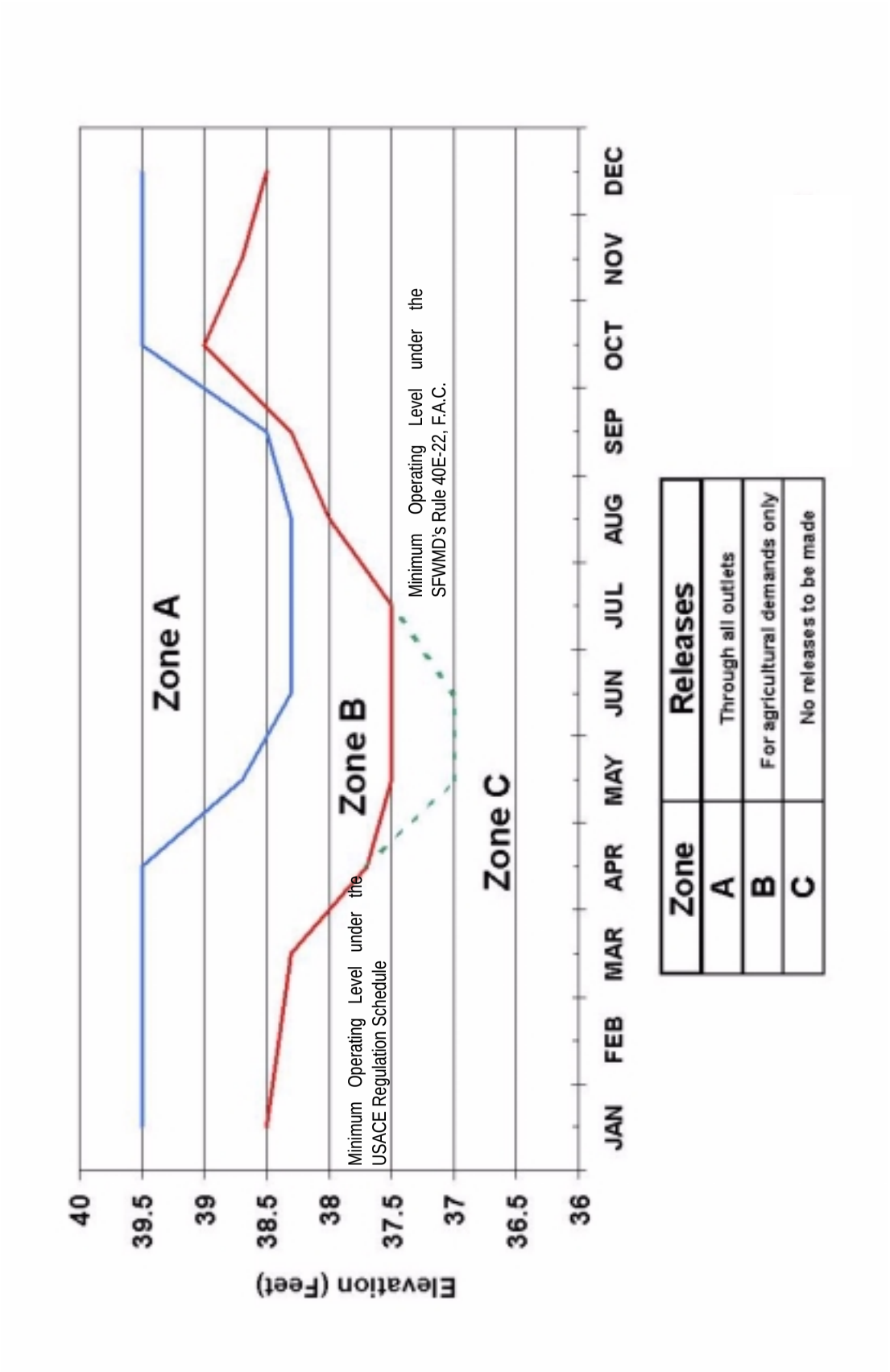


Figure C-11. Regulation Schedule for the Lake Istokpoga-Indian Prairie Subbasin.